Central Valley Regional Water Quality Control Board

Lower San Joaquin River

Salt and Boron TMDL

Implementation Framework

September 16, 2002

Workshop Agenda

- Introduction and Welcome
- San Joaquin River TMDLs Status and Basin Plan Amendment timeline
- Implementation Framework
  - Regulatory Authorities
  - Regulatory Controls
  - Non-Regulatory Controls
- Implementation Practices for Salt and Boron
  - Available Practices
  - Economic Considerations
- Concurrent Implementation of TMDLs

Introduction & Status

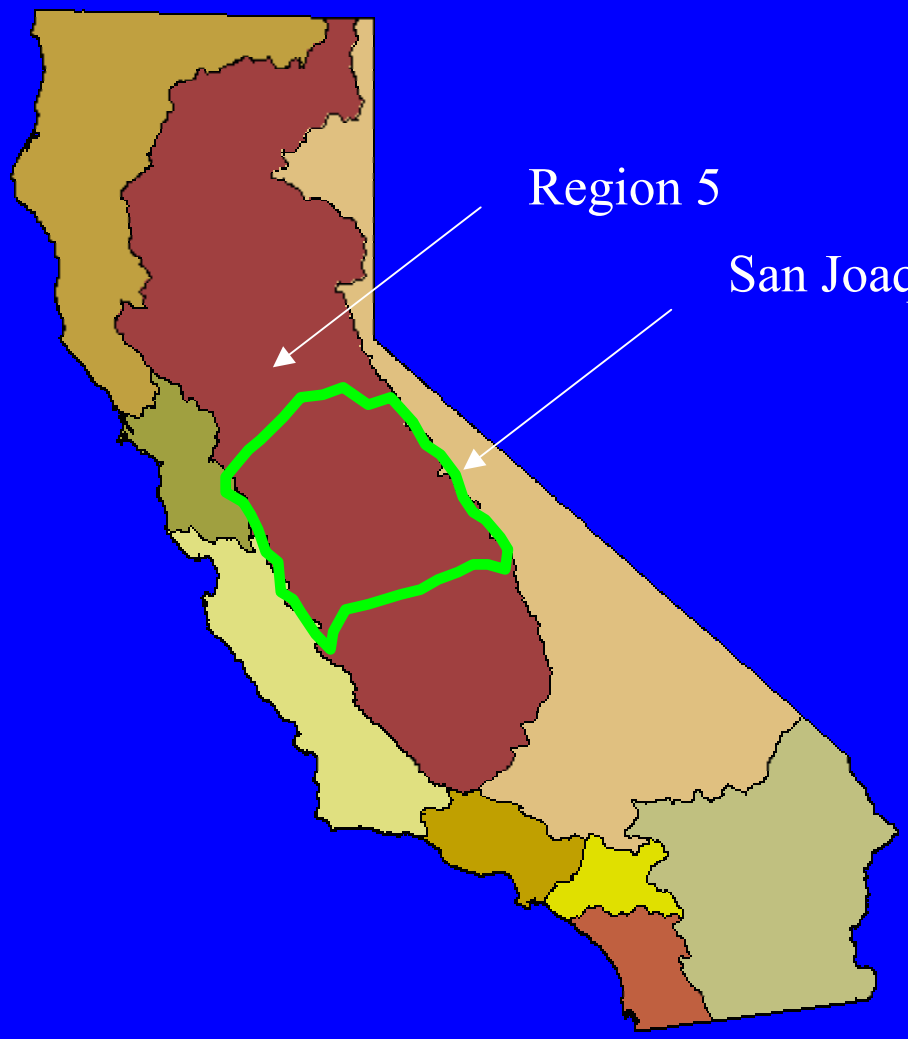
Les Grober

Introduction

- Meeting logistics
- Time constraints
- Questions and comments at the end
- Introduction of Regional Board staff

TMDL & Basin Plan Amendment Timeline

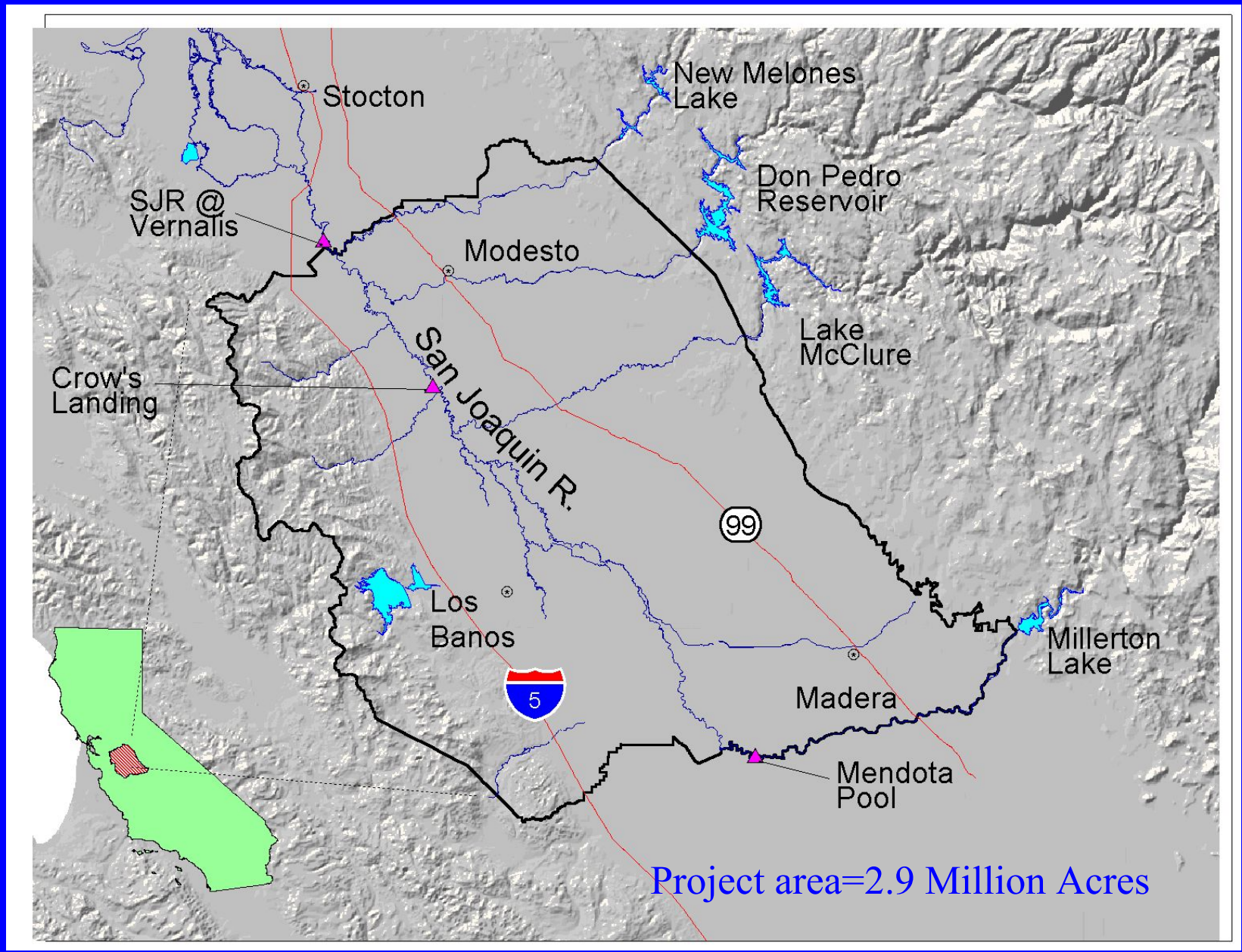
Technical TMDL report submitted to U.S. EPA and distributed to public	January 2002
Workshop on Technical TMDL Report	March 2002
Workshop on Draft Program of Implementation	September 2002
Draft Staff Report to Peer Review	October 2002
Public Review Draft	December 2002
Board Workshops/Revised Drafts	January 2002/ March 2003
Board Hearing	June 2003
State Board	October 2003
Office of Administrative Law	December 2003
U.S. EPA	March 2004


Region 5
San Joaquin River Basin

San Joaquin River TMDLs Status

- Salt and Boron
- Chlorpyrifos and Diazinon
- Dissolved Oxygen
- Selenium

Project Area for Salt and Boron TMDL



Concurrent salt and boron Basin Planning efforts for the LSJR

Basin Plan Amendment	Impetus
Salt and Boron Water Quality Objectives (upstream of Vernalis)	SWRCB D-1641
Salt and Boron TMDL	CWA § 303(d)

Implementation Framework

Eric Oppenheimer

Implementation Framework

- Regulatory Background
- Legal Authorities
- TMDL Implementation Background
- Implementation Options
  - Regulatory Control Options
  - Non-Regulatory Control Options

Regulatory Background

- Federal Clean Water Act
- Porter-Cologne Water Quality Control Act

Regulatory Background

- Federal Clean Water Act
  - Requires States to identify waterbodies not attaining water quality standards
  - Set priorities for addressing pollutant problems
  - Establish a TMDL for each identified waterbody

Regulatory Background

- Porter-Cologne Water Quality Control Act
  - Establishes responsibilities and authorities of the State Water Resources Control Board and Regional Water Quality Control Boards
  - Requires development of Water Quality Control Plans (Basin Plans)
    - Beneficial Uses
    - Water Quality Objectives
    - Program of Implementation

Assumptions

- Existing Salt and Boron Water quality objectives at Vernalis are protective of beneficial uses
- Load limits for agriculture and managed wetlands will be established
- Load limits for municipal and industrial discharges to the SJR will be established
- TMDL will be phased - first phase of the TMDL is for Vernalis
- No beneficial uses or water quality objectives will be developed for this phase

Assumptions (continued)

- Basin Plan cannot compel adoption of specific methods of compliance
- Basin Plan cannot compel specific action by other agencies
- A group may design a specific implementation program (and provide implementation oversight) but Regional Board would need to approve that program

Implementation Framework

- Regulatory Background √
- **Legal Authorities**
- TMDL Implementation Background
- Implementation Options
  - Regulatory Control Options
  - Non-Regulatory Control Options

Legal Authorities

- Legal authorities reviewed include:
  - Regional Water Quality Control Board
  - Counties
  - Water Districts
  - Joint Powers Authorities

Legal Authorities
Regional Water Quality Control Board

- Implements and enforces Federal and State water quality acts:
  - Clean Water Act
  - Porter Cologne
- Nine Regional Boards in the State - Central Valley Region is largest
- Basin Plan contains:
  - Beneficial uses
  - Water quality objectives
  - Program of implementation
  - Monitoring and surveillance

Legal Authorities
Regional Water Quality Control Board

- Clean Water Act responsibilities include:
  - Issuing National Pollutant Discharge Elimination System (NPDES) permits to point sources of pollution and certain stormwater discharges
  - Developing Total Maximum Daily Loads (TMDLs) for waters not meeting standards

Legal Authorities
Regional Water Quality Control Board

- Implementation of TMDLs:
  - Beneficial uses may be reviewed and evaluated
  - Numeric water quality objectives may be proposed
  - Program of implementation is needed

Legal Authorities
Regional Water Quality Control Board

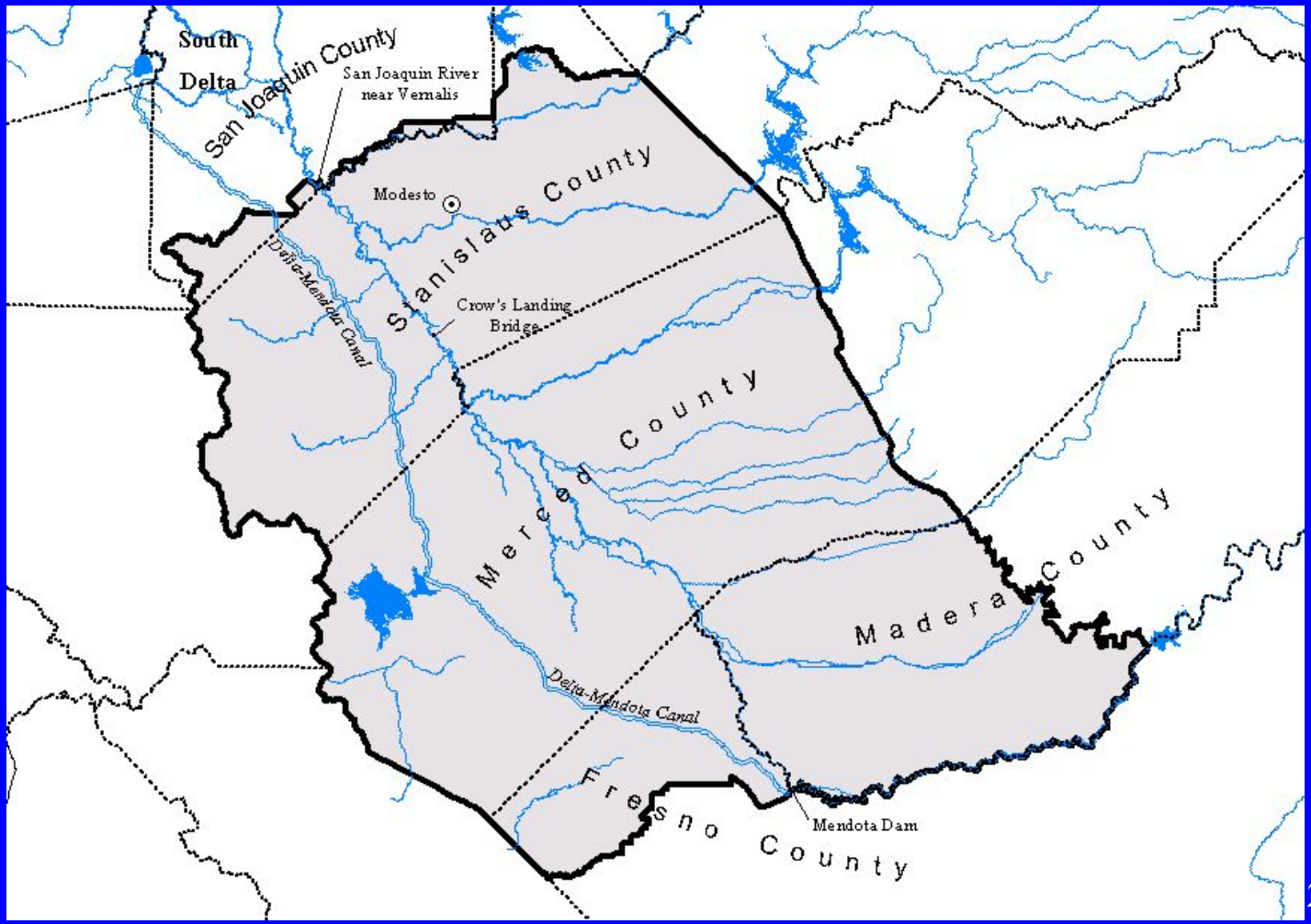
- Factors considered in setting water quality objectives:
  - Beneficial uses
  - Environmental characteristics of the watershed
  - Water quality condition that could reasonably be achieved
  - Economic considerations
  - Need for housing and to develop and use recycled water

Legal Authorities
Regional Water Quality Control Board

- Program of Implementation must include:
  - Description of the nature of the actions necessary to achieve objectives
  - Time schedule for actions to be taken
  - Description of surveillance to determine compliance

Legal Authorities

Counties:



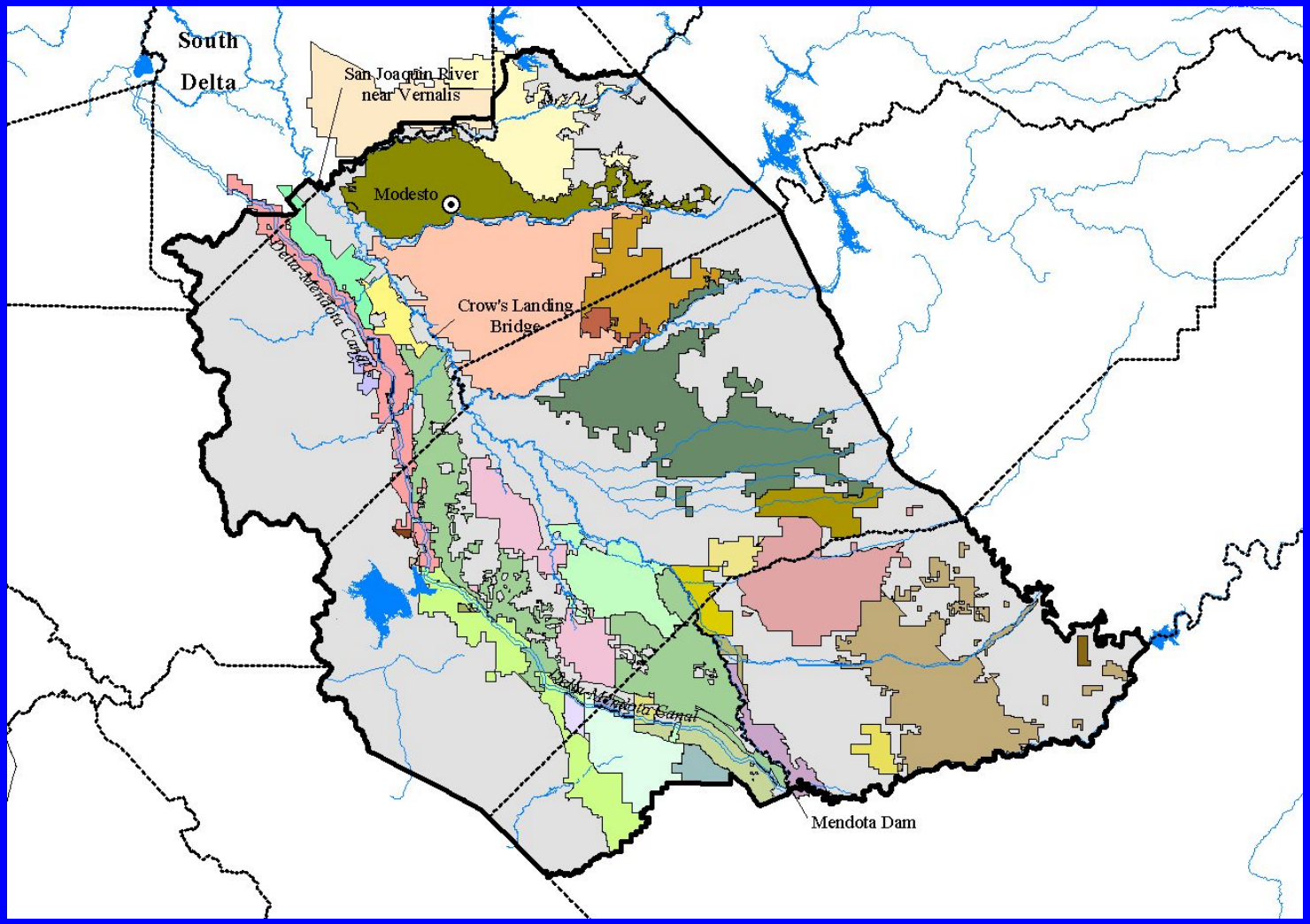
Legal Authorities

Counties:

- Have broad authority to supply water and provide for drainage services
- Authorized to undertake works for drainage and flood control
- Authorized to spend general fund money on watershed restoration

Legal Authorities

Water Districts



Legal Authorities

Water Districts:

- 11 general types of water districts
- Special acts have created numerous water districts
- Responsibilities can include one or more of the following:
  - Irrigation, reclamation, drainage, diversion, storage, flood control, management, and distribution of water

Legal Authorities

Joint Powers Authority/Regional Drainage Authority:

- Allows new authority to form with joint authorities of the member public agencies
- Has been used by San Luis & Delta-Mendota Water Authority to address selenium in the San Joaquin Valley
- San Joaquin River Group Authority - Vernalis Adaptive Management Program

Implementation Framework

- Regulatory Background √
- Legal Authorities √
- **TMDL Implementation Background**
- Implementation Options
  - Regulatory Control Options
  - Non-Regulatory Control Options

TMDL Implementation Background

- Current US EPA regulations do not require TMDLs to include implementation plans
- Federal Law requires that TMDLs, upon EPA approval, be incorporated into the state's water quality management plan (Basin Plan)
- State Law requires that Basin Plans have a program of implementation to achieve water quality objective

TMDL Implementation Background

- No new or modified beneficial uses are being proposed as part of the salt and boron TMDL
- No changes to existing water quality objectives are being proposed as part of the salt and boron TMDL
- A Program of implementation is needed

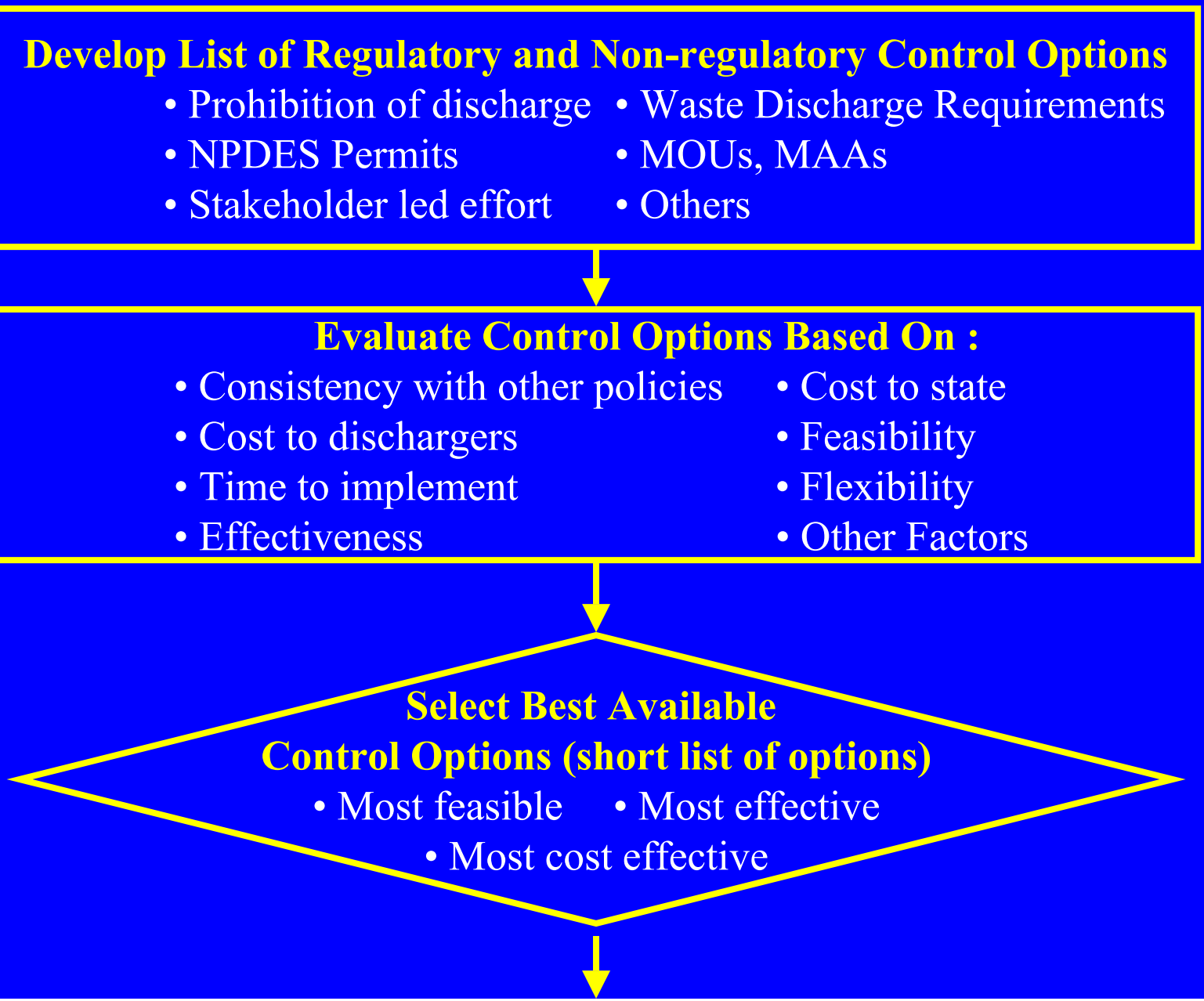
TMDL Implementation Background

- Program of Implementation must include:
  - Description of the nature of the actions necessary to achieve objectives
  - Time schedule for actions to be taken
  - Description of surveillance to determine compliance

Implementation Framework

- Regulatory Background √
- Legal Authorities √
- TMDL Implementation Background √
- **Implementation Options**
  - **Regulatory Control Options**
  - **Non-Regulatory Control Options**

Process for Developing Program of Implementation



Process for Developing Program of Implementation

Develop Alternatives

based on combinations of selected control options

Ranging from

No Action ---------to--------Full Regulatory

Evaluate Alternatives Based On :

- Consistency with other policies
- Cost to dischargers
- Time to implement
- Effectiveness
- Cost to state
- Feasibility
- Flexibility
- Other factors

Select Preferred Alternative

Regional Water Quality Control Board
Options to Regulate Discharges

- NPDES Permits
  - Applies to point source discharges
  - Return flows from irrigated agriculture cannot be regulated under NPDES
- Waste Discharge Requirements
  - Nature of the discharge are prescribed
  - Site specific or general
- Waiver of Waste Discharge Requirements
  - Requirement for WDRs may be waived if not against the public interest
  - Waivers are conditional-- may be terminated at any time
- Prohibition of Discharge
  - Regional Board can identify areas or conditions under which discharge of certain wastes is not permitted

Implementation Framework Regulatory Control Options

- What is needed?
  - Identify regulatory mechanism (prohibition, WDR, waiver of WDRs)
  - Identify entity responsible for oversight
- Result: matrix of regulatory alternatives versus entity responsible for oversight…

Matrix of Options

	Entity Responsible for Implementation Oversight			
Option	Regional Board	USBR	Local District	Stakeholder or Other Group
Prohibition of Discharge				
WDRs				
Waiver of WDRs				

Implementation Framework Regulatory Control Options

- Several variations of each option are being considered; for example, a prohibition of discharge may:
  - Be conditioned upon submittal of a management plan
    - A stakeholder group or the Regional Board may have responsibility of direct oversight
  - Apply to a specific area
  - Be conditioned on compliance with TMDL
  - Be conditioned on participation in a real-time management program

Implementation Framework Options

- Waste Discharge Requirements
  - Waste Discharge Requirements issued to "persons" (including public/private entity) discharging waste
  - Waste Discharge Requirements can be general (applying to a category of discharge) or individual

Implementation Framework Options

- Waste Discharge Requirements – Individual
  - Submittal of individual report of waste discharge required
  - Could be issued to:
    - Individual farmer/land owner
    - Water districts that have responsibility for drainage management
    - Water suppliers such as the USBR for discharges of salts in supply water

Implementation Framework Options

- Waste Discharge Requirements – General
  - Would require a "Notice of Intent" –less paperwork and/or smaller fees than individual WDR
  - Could be tailored to specific sub-areas or only apply to certain areas
  - Could be phased in over time

Implementation Framework Options

- Waiver of Waste Discharge Requirements
  - Waste Discharge Requirements can be conditionally waived if not against the public interest
  - Waiver could apply if a management plan approved by a stakeholder group (Option 3.a.1) or Regional Board (Option 3.a.2) is being followed

Implementation Framework Non-Regulatory Control Options

- Education and outreach
- Implementation funding through grants and low interest loans
- MOUs/MAAs with USBR or Water Districts
- Stakeholder led efforts to comply with TMDLs

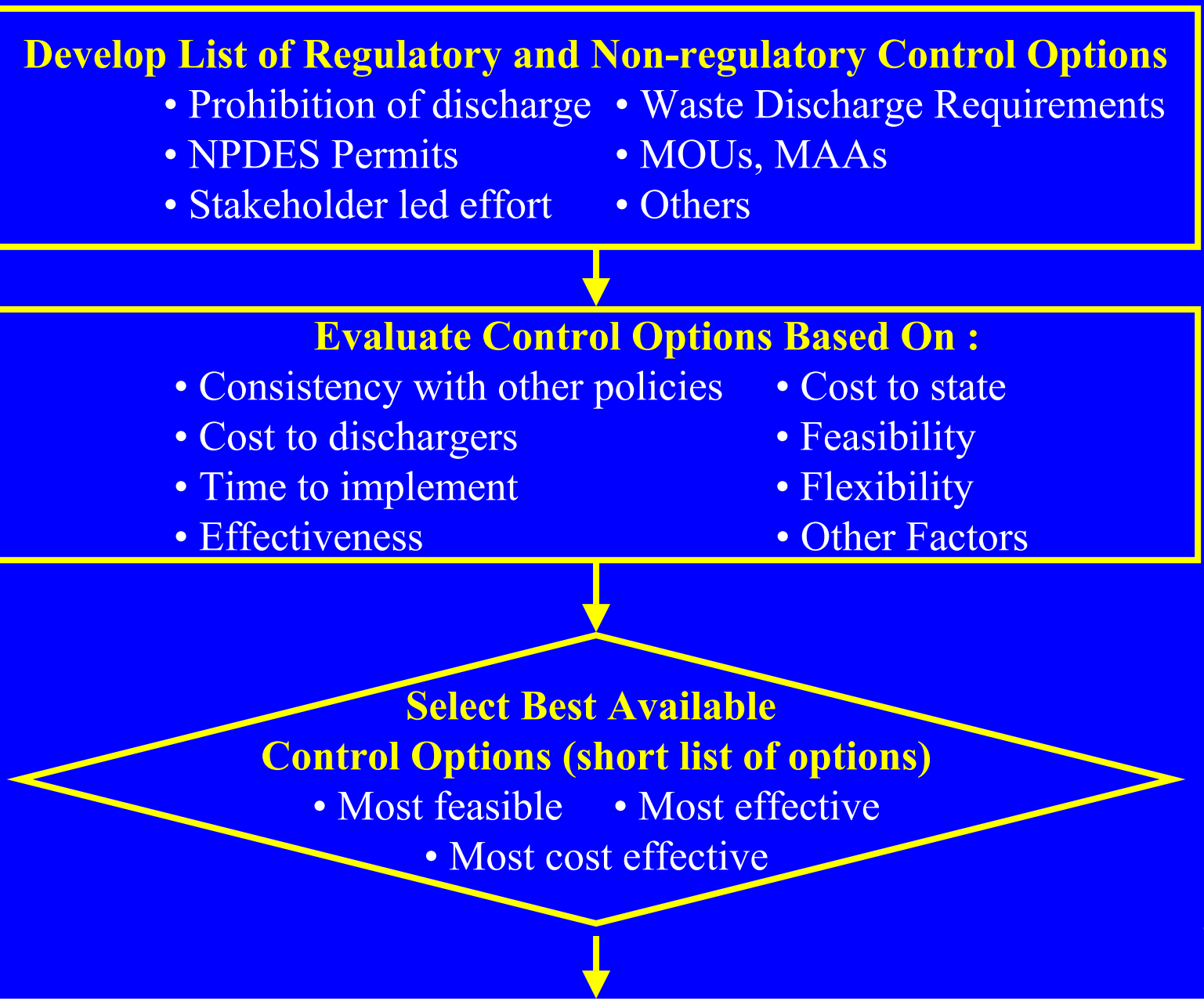
Evaluation of Control Options

- Evaluation criteria that will be used to develop a recommended approach
  - **Feasibility**
  - **Effectiveness**
  - **Cost**
  - **Likelihood of Success**
  - **Certainty in meeting Water Quality Objectives**
  - **Time Needed to Implement the Option**
  - **Consistency With Laws and Policies**
  - **Restrictions to Agricultural and Wetland Operations**

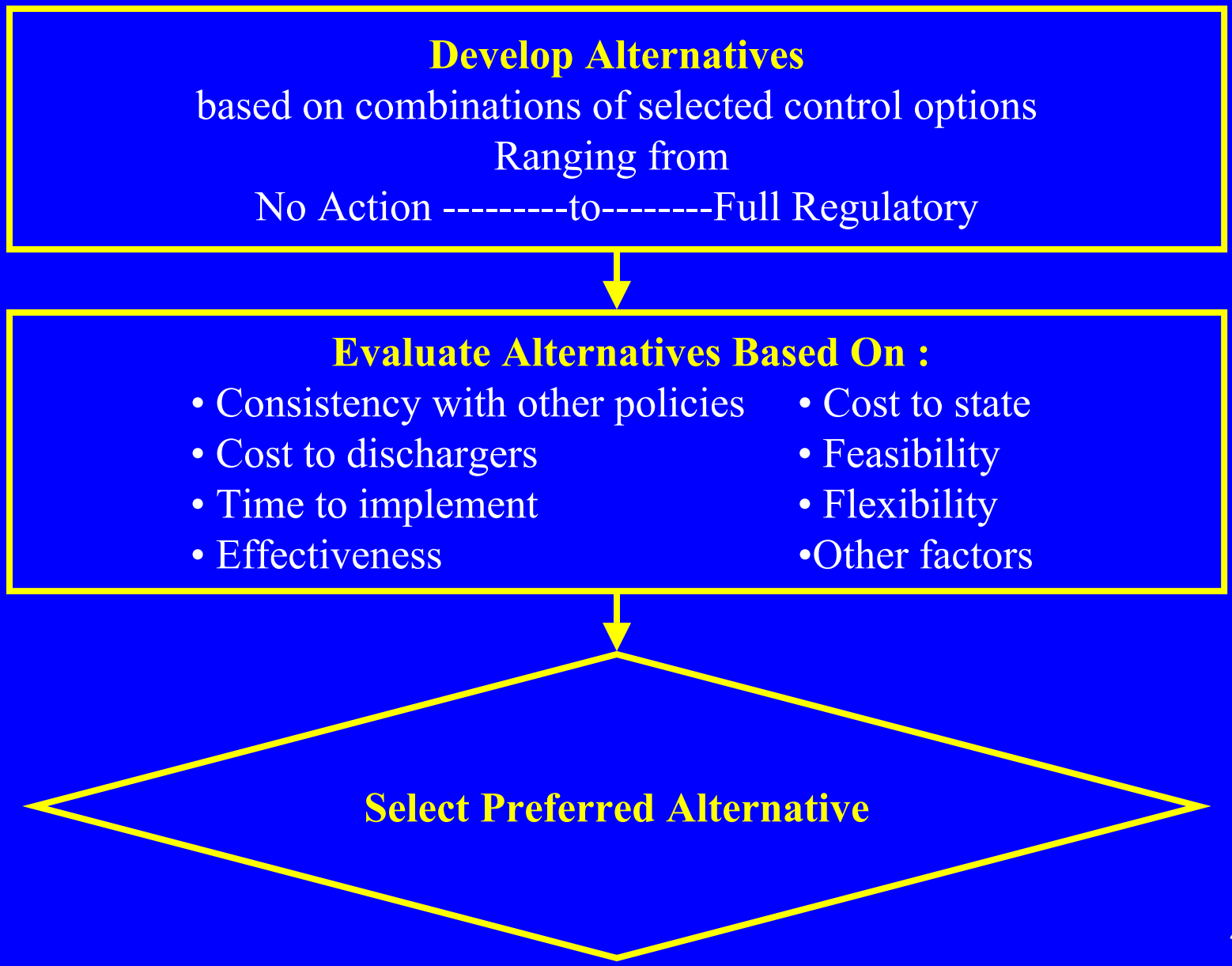
Alternatives

- The most feasible, effective, and efficient regulatory control options and non-regulatory control options will be selected to develop alternatives
- Alternatives will be evaluated based on the same criteria as the options

Process for Developing Program of Implementation



Process for Developing Program of Implementation



Break

Implementation Practices for Salt and Boron

Les Grober

Methods for Improving Salt and Boron Concentrations in the San Joaquin River

1) Reduce salt imports to the basin
2) Provide more water
3) Control/reduce salt discharges
4) Export more salt out of basin (disposal)
5) Real time water quality management

Reduce Salt Imports to the Basin

- **Improve Quality of Supply Water (Delta)**
  - Approximately 500 thousand tons of salt per year are currently imported to the LSJR Basin via the Delta Mendota Canal (DMC)
  - Salts imported to the Basin are roughly equal to 50 percent of the mass salt emission from the basin at Vernalis

Provide More Water to the San Joaquin River

- Increasing San Joaquin River flows
  - Provides increased assimilative capacity
- Regional Board does not have authority over water rights
- SWRCB's Decision 1641 requires the USBR to make water quality releases to meet the Vernalis salinity water quality objective

Reduce Salt Discharges

From:

- Agricultural drainage
  - Surface drainage (tailwater)
  - Subsurface drainage (tilewater)
- Managed wetlands
- Municipal and industrial sources
  - Wastewater treatment plants

Methods for Controlling Salt Discharges

Were evaluated as part of the San Joaquin Valley Drainage Implementation Program (SJVDIP) and the University of California Salinity/Drainage Program

Methods for Controlling Salt Discharges

Eight Technical Committee reports were completed in 1999

- Source control
- On-farm drainage reuse
- Drainage treatment
- Land retirement
- Evaporation ponds
- Groundwater management
- River discharge
- Selenium and salt utilization

Methods for Controlling Salt Discharges

- Water conservation
- Tailwater/tilewater recovery
- Sequential reuse and volume reduction
- Integrated on farm drainage management
- Evaporation ponds
- Water treatment
- Land retirement
- Reduce municipal and industrial sources of salt

Methods for Controlling Salt Discharges

Water conservation

Use of improved irrigation methods, such as sprinklers and drip irrigation

Benefits

- **Reduces the volume of water that must be: imported into the basin; diverted from the LSJR; or pumped from groundwater**
- **Less mobilization of in-situ salts and a reduction in the amount of imported salt**

Considerations

- **Need to leach salts and avoid salt build-up in soils and groundwater**

Methods for Controlling Salt Discharges

Tailwater/tilewater recovery

Collection and reuse of tailwater to irrigate crops at the field, water district or regional level

Benefits

- **Can be used reduce or eliminate salt loading from tailwater, tilewater and wetland discharges**
- **Improved water use efficiency**

Considerations

- **Could remove high quality water from the system**

Methods for Controlling Salt Discharges

Sequential reuse and volume reduction

Multiple use of irrigation water on progressively salt-tolerant plants in order to concentrate and reduce volumes of saline water

Benefits

- **Helps reduce instantaneous peak loads of salt to the LSJR**

Considerations

- **Disposal of concentrated salts**

Methods for Controlling Salt Discharges

Integrated on-farm drainage management

- **Management of drain water, salt and trace elements on individual farms or in a farming area**
- **Sequential re-use on increasingly more salt tolerant crops, forages, and halophytes**
- **Final discharge of concentrates to solar evaporator**

Considerations

- **Disposal or use of accumulated salts**

Methods for Controlling Salt Discharges

Evaporation ponds

Saline discharges in excess of load allocation are impounded and evapoconcentrated

Benefits

- **Can be used to reduce or eliminate salt loading from all discharges**
- **Salt can be isolated**

Considerations

- **Disposal of concentrated salts**
- **Evapoconcentration of trace elements**
- **Wildlife/habitat compensation**

Methods for Controlling Salt Discharges

Water treatment

Treatment methods, such as reverse osmosis and ion exchange, could be used to remove salt and boron as well as trace elements

Benefits

- **Removes salts and trace elements**
- **Can be used to reduce or eliminate salt loading from all discharges**

Considerations

- **Most suitable for highly concentrated wastes**
- **Pre-treatment**
- **Must consider disposal of waste brine**
- **Cost**

Methods for Controlling Salt Discharges

Land retirement

Cessation of irrigation on soils overlying shallow ground water that is high in selenium, salts, and/or boron

Benefits

- Drainage reduction
- Reduced salt imports

Considerations

- Must occur in conjunction with reduced water imports
- Cultural/economic impacts

Methods for Controlling Salt Discharges

Reduce municipal and industrial sources of salt

Source control, additional treatment processes, or application of waste to land

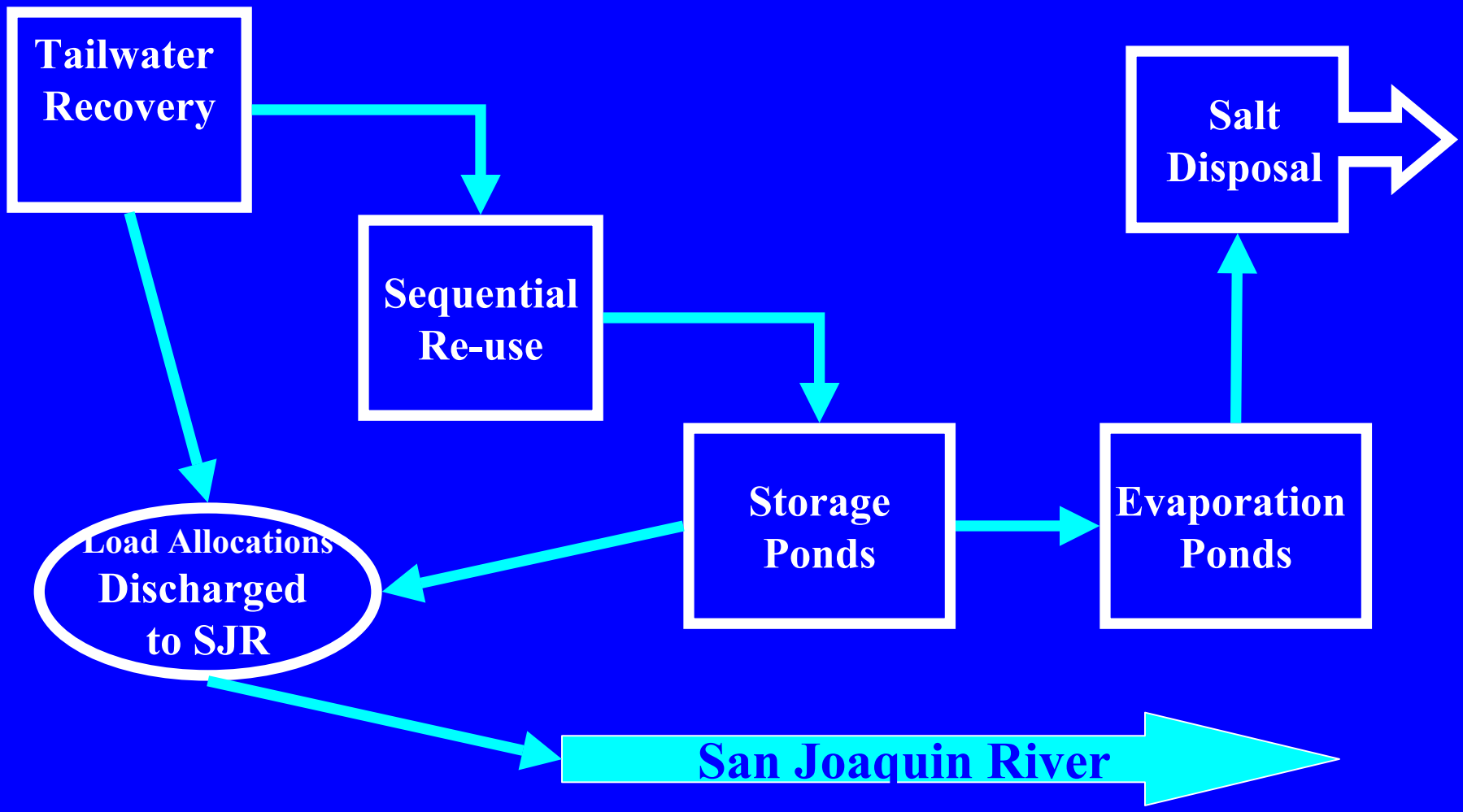
Benefits

- **Well characterized discreet sources**
- **Reduced loading to river**
- **Already regulated –interim salt load limits**

Considerations

- **Only represent a small portion of the total salt loading to the San Joaquin River**

Example Implementation Scenario Using Multiple Practices



Methods for Controlling Salt Discharges

More information:

San Joaquin Valley Drainage Implementation Program

http://wwwdpla.water.ca.gov/agriculture/drainage/implementation/hq/title.htm

Export More Salt out of the Basin/Disposal

- Build a Drain
- In Valley Disposal

Export More Salt out of the Basin

Valley drain

Regional Board's Policy for Obtaining Salt Balance in the San Joaquin Valley states in part that:

It's the policy of the Regional Water Board to encourage construction of facilities to convey agricultural drain water from the San Joaquin and the Tulare Basins…

In Valley Disposal

- Integrated on-farm drainage management
- Regional storage / disposal
- Centralized storage / disposal

Real-time Water Quality Management

What is Real-time management?

- Real time management is the real time coordination of discharges to meet water quality objectives
  - Real time: telemetry
  - Coordination: shift in the timing of both freshwater and saline water discharges
- What is needed for real time management?
  - Monitoring data and telemetry
  - Processing and modeling of this data
  - Management using the processed data

Real-time Water Quality Management

Why use Real-time Management?

- Salt and boron TMDL includes opportunities for dischargers to utilize a real-time load allocation program in-lieu of more conservative base load allocations

- Real-time load allocation allow for more loading than the base load allocations

- Opportunity to maximize salt discharges from the basin while still meeting water quality objectives

Real-time Water Quality Management

What is needed?

- A real-time system that provides assurances of meeting real-time load allocations
  - Water district level monitoring, telemetry, modeling, forecasting
  - Coordinating entity (e.g. Joint Powers Authority)
  - Facilities (detention ponds, conveyances)

Real-time Water Quality Management

Status

- Current CALFED funded Real-time water quality management program, operating since April 1999 has:
- Installed, upgraded and maintained real-time WQ monitoring stations
- Provided weekly forecasts of SJR conditions and available assimilative capacity
- Demonstrated that opportunities exist to export more salt and improve water quality through real-time management

Real-time Water Quality Management

Status (continued)

- CALFED funded Real-time water quality management program is schedule to terminate in December 2002
- Agencies are seeking additional funding to continue the program
- There has been limited interest, involvement, or on-the-ground response from dischargers
- Real-time water quality management must be transformed from an agency driven program to a discharger driven program

Drainage Management Planning

- We anticipate that drainage management plans will need to be developed to ensure implementation of any management practice or suite of practices

- Drainage management plans could be developed at the farm level,water district level, or sub-area level (multiple districts).

Drainage Management Planning

Drainage management plans would likely include:

- A map of the geographic area being addressed
  - Location of supply water and drainage canals and the direction of flow in these conveyances
  - Location of all surface water diversions
  - Location of discharge points
  - Location of monitoring sites

- A description of the structural and operational implementation practices used to control discharges and comply with load allocations

A Cost Estimate Survey for Reducing the Discharge of Salt and Boron into the San Joaquin River

Wayne Cooley

Economic Considerations

- Porter-Cologne requires that economic considerations must be one of the factors considered by the Regional Board when establishing TMDL water quality objectives (PC §13241)
- In addition, Porter-Cologne specifies that before any agricultural water quality control program can be implemented the total cost of the program must be estimated, and potential financing sources must be identified (PC §13141).

Past Work

- Agricultural Drainage and Salt Management in the San Joaquin Valley (SJVIDP, 1979)
- Technical Committee Report: Regulation of Agricultural Drainage to the San Joaquin River (SWRCB, 1987)
- A Management Plan For Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley (SJVDP, 1990)
- San Joaquin Valley Hydrologic and Salt Load Budgets (SJVDP, 1988)
- Data Refinements and Modeling Results for the Lower San Joaquin River Basin (U.C. Davis, 1989)

More Recent Work

- **San Luis Unit Drainage Feature Re-Evaluation, Preliminary Alternatives Report (USBR, 2001)**
- **Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River (CVRWQCB, 2002)**
- **The Economic Costs of Water Conservation and the Impact of Uncompensated Conservation on the Economic Viability of Farming in the Imperial Valley (Stratecom Inc., 2002)**
- **Southwest Stanislaus County Regional Drainage Water Management-Marshall Drain Improvements (SJVDA, 2001)**
- **Personal Communication (Summers Engineering ,2002)**

Limitations of Past Work

- Did not Focus on the Protection of the San Joaquin River as the Primary Goal like the Salt and Boron Basin Plan Amendment and TMDL
- Concentration on Subsurface Agricultural Drainage Problems
- Earlier Work was not able to Incorporate Actual Capital and Operating Costs
- Work Concentrated on Shallow Groundwater and Saline Groundwater
- Acreage Based vs. Acre-Ft of Water Treated Approach

General Approach

- Develop Volume Based Costs for Various Water Treatments
- Develop Estimates of Volumes of Waters Needing Treatment
- Use Known EC and Boron Concentrations Coupled with Discharge Quantities to Estimate Treatment Costs

What the Cost Estimate Survey is Not

- Least Cost Analysis
- Cost-Benefit Analysis
- Iterative Linked Hydrology-Production Model like the Wade Model

Cost Survey of the Following Treatment Processes:

- Tail Water Re-circulation
- Tile Water Re-circulation
- Reuse
- Evaporation Ponds
- Real-Time Water Management
- Land Filling (Disposal) of Salts and Trace Minerals

Tail Water Re-circulation Systems

- Capital Costs to Install Tail Water Re-circulation Systems Ranged from $40 per Acre to $650 per Acre.
- Capital Costs for the Marshall Drain Tail Water Recovery System is Estimated to Cost over $500 per Ac-Ft or $26 per Ac-Ft/Year over 20 years
- Imperial Valley Study (23 Systems) reflected

  O & M Costs of $55 Ac-Ft per Year
- Cost Estimate Used Total Yearly Costs over 20 Years to be $81 per Ac-Ft per Year

Tile Water Re-circulation Systems

- Capital Costs to Install Tile Water Re-circulation Systems Ranged from $80 per Acre to $110 per Acre.
- Capital Costs for some Tile Drainage Systems in the Grasslands Area ran as high as $100 per Acre (Assuming .4 ac-ft/ac drained) converts to $250 per Ac.-Ft./Year. A 20 Year Average being $13 Ac-Ft. (Summers Engineering)
- O & M Cost estimates used were $50 Ac.-Ft.
- Total Estimated Costs used were $63 Ac.-Ft.

Reuse

- Cost Estimates used Included Cost of Land, Planting, Installing Shallow-Densely Spaced Tile Drainage System,and Irrigation System Installation
- Capital Costs over 20 Years were Estimated at $50/Year/Ac-Ft.
- O & M Costs were Estimated to be $200/Year/Ac-Ft.
- Total Costs $250 Ac-Ft./Year over 20 Years (Summers Engineering, 2002)

Evaporation Ponds

- Cost estimates were developed for an evaporation pond facility that would encompass 1280 acres (approximately 1130 acres of pond surface). The facility would be divided into twelve 100-acre ponds with flow control devices between ponds
- Total Annualized Costs $630 Ac-Ft/Year (USBR, 2001)
- Costs Include Land Acquisition, Including Compensatory Land, Earthwork, Fencing, Geomembrane Liner, Bird Netting and 30% Contingency

Real-Time Water Management

- Water Right Decision 1641
- "As part of its implementation plan for the salinity objectives, the Central Valley RWQCB should evaluate a program to regulate the timing of agricultural discharges to the San Joaquin River"

Real-Time Water Management

- Use Evaporation Ponds (4,500 Ac-Ft Storage Capacity) (USBR, 2001) $630 Ac-Ft/Year
- Those ponds would contain EC measuring devices and would be gated to a conveyance system that could deliver water to the LSJR.
- Total capital costs might approach $250,000 per system
- Expensive Conveyance Systems could increase costs significantly
- Operation and Maintenance is estimated to be about $25,000 - $50,000 Year
- Real Time Water Management night cost $20-30 Ac-Ft (excluding Evap. Pond Costs).

Landfill Disposal

- Estimated to be $20 per ton tipping fee to a Class II landfill and $100 per ton hauling cost (USBR, 2001)
- Nearly 500,000 Tons of Salt are Imported via the CVP into the LSJR per year
- An Ac-Ft of Water with an EC of 1200 carries about a ton of salt

Monitoring

Eric Oppenheimer

Monitoring

- Porter-Cologne requires a description of the monitoring that will be done to determine compliance with objectives
- Need to establish monitoring goals in the Basin Plan
- Specific monitoring plan would be developed later

Monitoring

- Goals of monitoring are to determine:
  1. Compliance with established water quality objectives
  2. Compliance with sub-area load allocations
  3. Degree of implementation of management practices
  4. Efficacy of management practices

Monitoring

- Water quality and flow monitoring
  - Main stem river sites (goal 1)
  - Tributary and subarea sites (goal 2)
  - Water District Scale (goal 4)

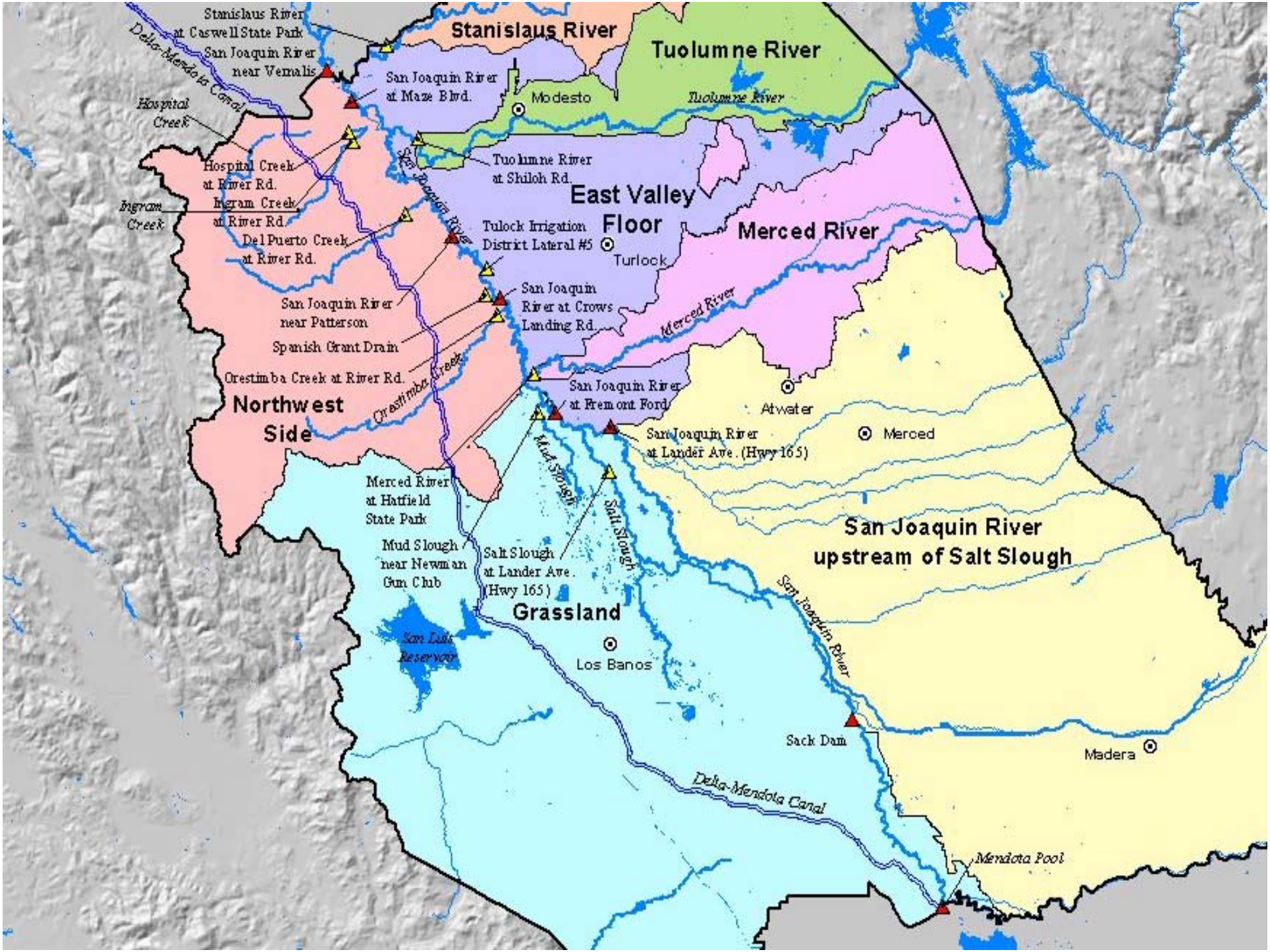
Monitoring Responsibilities

- Regional Board, USGS, DWR, and USBR currently conduct long-term flow and EC monitoring at numerous locations

- Responsibility for monitoring ultimately rests with the discharger

Potential Monitoring Sites for Meeting Monitoring Goal #1

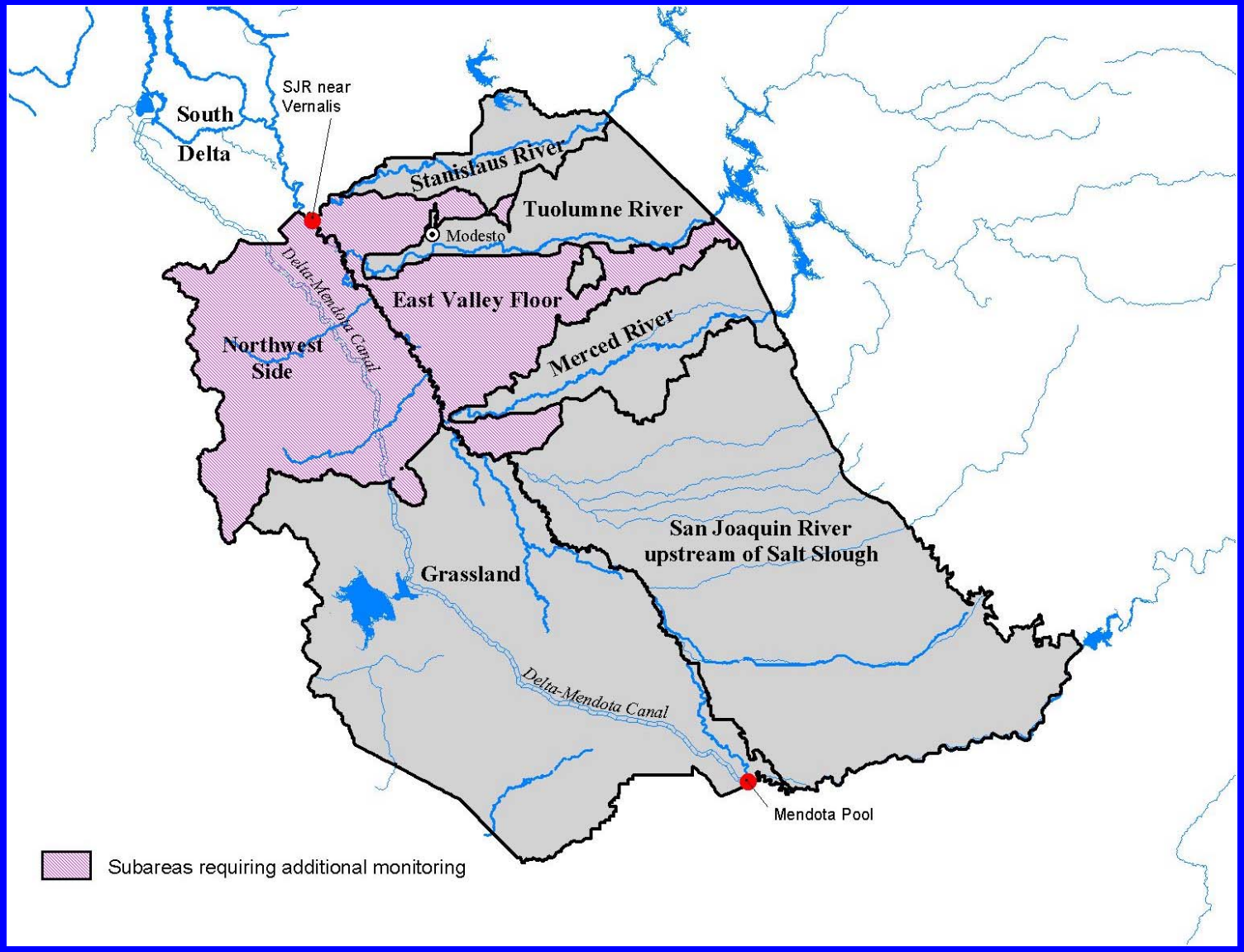
Site	Sampling Point
San Joaquin River Near Vernalis	**On the west bank of the San Joaquin River at the south side of the Airport Way bridge.**
San Joaquin River at Maze	On the northwest side of Highway 132. Bridge approximately 100 yard north of the bridge.
San Joaquin River at Patterson	North of Patterson bridge at the fishing access off of Poplar Ave.
San Joaquin River at Crows Landing	On the southeast side of Crows landing bridge
San Joaquin River upstream of Merced River	On the west bank of San Joaquin River approximately 30 yards south of Merced River. Access to the site is via Hills Ferry Road.
Fremont Ford	At Fremont Ford on the west bank of the San Joaquin River at Highway 140.
San Joaquin River at Lander Ave.	Approximately 16.5 miles north of Los banos on Lander Ave.
Sack Dam	East of Highway 33 at Das Palos via Valeria Ave.
Mendota Pool	To be determined


Stanislaus River
at Caswell State Park
San Joaquin River
near Vernalis
Delta-Mendota Canal
Stanislaus River
Tuolumne River
San Joaquin River
at Maze Blvd.
Modesto
Tuolumne River
Hospital
Creek
Hospital Creek
at River Rd.
Ingram Creek
at River Rd.
Ingram
Creek
Del Puerto Creek
at River Rd.
San Joaquin River
Tuolumne River
at Shiloh Rd.
East Valley
Floor
Merced River
Tulock Irrigation
District Lateral #5
Turlock
San Joaquin
River at Crows
Landing Rd.
San Joaquin River
near Patterson
Spanish Grant Drain
Orestimba Creek at River Rd.
Orestimba Creek
Merced River
San Joaquin River
at Fremont Ford
Atwater
Merced
San Joaquin River
at Lander Ave. (Hwy 165)
Northwest
Side
Merced River
at Hatfield
State Park
Mud Slough
Salt Slough
Mud Slough
near Newman
Gun Club
Salt Slough
at Lander Ave.
(Hwy 165)
San Joaquin River
upstream of Salt Slough
San Joaquin River
Grassland
San Luis
Reservoir
Los Banos
Sack Dam
Madera
Delta-Mendota Canal
Mendota Pool

Monitoring For Sub-area Load Allocations

- Monitoring is conducted to determine the salt and boron load
- Monitoring will be established
  - at sites near the mouth of watershed
  - at sites that characterize sub-areas
- Additional monitoring is needed to monitor compliance with load allocations for Northwest Side and East Valley Floor sub-areas

Sub-areas Needing Additional Characterization to Achieve Monitoring Goal



Potential Monitoring Sites for Meeting Monitoring Goal #2

Watershed / Source Area	Monitoring Sites
Stanislaus River	Stanislaus River at Caswell Park
Tuolumne River	Tuolumne River at Shiloh Road
Merced River	Merced River at Hatfield
Northwest	**Ingram Creek, Hospital Creek, Del Puerto Creek, Orestimba Creek, Spanish Creek, other drains**
East Valley Floor	**TID #1,2,3,5,6,7** **MID #3,4,5,7 other drains and spills**
Grassland	Salt Slough and Mud Slough
Upstream of Salt Slough	San Joaquin at Lander Ave

Monitoring to Facilitate Implementation and Real-time Management

- Additional Monitoring is needed at the district level to manage salt loads within the districts, determine compliance with sub-area load allocations, and for real-time management
- Monitoring site selection and details of real time implementation should be determined by the dischargers and must be approved by Regional Board

Monitoring Effectiveness of Management Practices

- To access the effectiveness of specific practices
- Field level evaluation
  - To quantify the amount of load reduction

Concurrent Implementation of TMDLs

Les Grober

Concurrent Implementation of TMDLs

- San Joaquin River Basin TMDLs
- San Joaquin River Salt and Boron Basin Plan Amendment
- Ag Waivers

San Joaquin River Basin TMDLs

TMDL	Technical TMDL	Basin Plan Amendment / USEPA Approval
San Joaquin River selenium	August 2001	1996 / March 2002
San Joaquin River salt & boron	January 2002	June 2003
San Joaquin River diazinon & chlorpyrifos	July 2002	June 2003
Delta Waterways (Deep Water Ship Channel) dissolved oxygen	June 2003	June 2004

SJR Selenium TMDL

- Main source of selenium:
  97,000 acre Drainage Project Area
- Program of Implementation, Basin Plan Amendment, and Waste Discharge Requirements in place prior to completion of TMDL
- TMDL load limits established to meet selenium water quality objectives in the SJR

SJR Selenium TMDL Success

- Regulated and coordinated discharge from 97,000 acre Drainage Project Area
- Partnership between USBR, San Luis and Delta Mendota Water Authority, and the Grassland Area Farmers
- Successful implementation and operation while under Waste Discharge Requirements

Diazinon and Chlorpyrifos TMDL

- Source Area: entire Lower San Joaquin River - approximately 2.9 million acres
- Draft TMDL report submitted to USEPA in June 2002
- Load allocation for subareas in project area
- Draft Implementation Framework report completed on September 2002

Diazinon and Chlorpyrifos TMDL

- Draft Basin Plan Amendment staff report will include:
  - Numeric water quality objectives
  - Load allocations
  - Program of implementation

- Draft staff report by December 2002

Dissolved Oxygen TMDL

- Stakeholder process
- Source analysis
  - Non-point sources in upper watershed (nutrients, algae)
  - Wastewater treatment plants
  - Channel volume
  - Reduced flows
- Load allocation considerations
  - Organic matter, nutrients, algal production, local WWTP, tidal barrier operation, flow, deep water ship channel

Dissolved Oxygen TMDL

- Possible Regional Board Actions:
  - Ag discharges may not qualify for waiver
  - Point sources may not get NPDES permit
  - No water quality certification for channel dredging
  - May recommend to State Board to not approve water transfers

TMDL Challenges

- Possible restrictions on ability to discharge from agricultural or wetland areas
- Possible limits on municipal discharges
- Possible limits on ability to transfer water
- USBR responsibility for impaired water supply
- Limits to what can be achieved through regulatory authority of Regional Board

San Joaquin River Salt and Boron Basin Plan Amendment

- New salt and boron water quality objectives upstream of Vernalis
- New objectives will be incorporated into TMDL
- Beneficial uses may be reviewed

Next Steps

- Draft Basin Plan Amendment staff report:
  - Beneficial uses
  - Water quality objectives
  - Program of implementation
  - TMDL elements (loading capacity, allocations, margin of safety)
  - Surveillance and monitoring

How You Can Contribute

- Provide feedback on:
  - Draft Implementation Framework

  (provide ideas on implementation alternatives)
  - Participate in Draft Basin Plan Amendment Workshops (December and March)